

## CLOSURE FOR COLLAPSIBLE CONTAINER

### Field of Invention

This invention relates to closures for collapsible containers.

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### Background Art

In my Australian patent no. 738438, I have described a collapsible container having an internal closure valve. As the container is emptied of its contents, the side walls of the container are able to collapse reducing the volume of the container, the closure valve providing a seal between the remaining contents and the spout of the container.

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The present invention has similar objectives to the invention described by my Australian patent no. 738438 and is primarily aimed at reducing the costs of such containers.

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Further objects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

### Disclosure of Invention

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According to the present invention, there is provided closure means for a collapsible liquid container having an externally threaded spout, said closure means comprising:

- (a) a cap having air bleed means;
- (b) a valve located within the spout said valve having a peripheral flange adapted to be seated between the top edge of the threaded spout and the cap, and a semispherical diaphragm dome which extends into the spout, the arrangement and construction being such that as the liquid content of the container is reduced, headspace air within the container can be evacuated via the air bleed means.

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The bleed means may include an air passage situated on the inner wall of the cap and an aperture or apertures in the top or side walls of the cap which vent the interiors of the container to atmosphere.

The spout includes a peripheral internally directed ledge.

The valve may be moulded in a material such as silicone or similar.

The cap may be moulded in plastics.

5 The container may be moulded in plastics.

The container may be formed from a laminate including a paperboard.

The closure means may include a biasing spring positioned between the base of the dome and the cap.

10 **Brief Description of the Drawings**

Aspects of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a sectional drawing of the spout of a flexible container showing closure means according to the present invention, and

15 Figure 2 is a side view of a flexible bottle container showing the closure means of the present invention detached, and

Figure 3 is a side view of a box-type container showing the closure means of the present invention attached thereto.

20 Figures 4, 5, 6 and 7 are sectional drawings of a further possible form of the present invention.

With respect to the drawings, the present invention provides a closure means generally indicated by arrow 1 for fixture to a collapsible liquid container 2, 3.

25 The closure means comprises a cap 4 having an air bleed facility and a valve generally indicated by arrow 5.

The valve is provided with a peripheral flange 6 which is adapted to be seated between the top edge 7 of a threaded spout 8 of the container and the top wall 9 of the cap 4, and semi-spherical dome 10 which extends into the spout.

30 An air bleed facility is provided by an interaction between the cap 4 and the valve 5.

The cap 4 is provided with an internal thread 11 to match the

external thread 12 of the container.

The internal walls of the cap are provided with a plurality of flutes 13 each of the flutes leading to apertures 14 in the top wall of the flutes.

As the contents of the containers are used and it is desired to  
5 reduce the evacuated air from the headspace of the container, the cap and diaphragm are replaced and axial pressure is applied to the container forcing the ledge of the diaphragm to lift and air is evacuated via the apertures in the manner illustrated by figure 1.

The cap is set to "vent" at one half turn from the fully sealed  
10 position thus allowing the valve clearance from the cap and the bottle.

As the fluid in the container reaches the valve its buoyancy locks it against the cap creating an air lock and stopping further evacuation of air or moisture.

Recoil from the collapsing container creates reverse suction that  
15 forces the valve back onto the top edge of the spout of the bottle, thus creating the hydraulic lock required to prevent re-inflation of the bottle.

A final permanent seal is created by twisting the cap until it is fully closed. Indicia on the cap and bottle can be provided which indicate both sealed and venting positions.

The venting path of air from the headspace is indicated by the  
20 directional arrows to the right hand side of figure 1.

Evacuated air passes over the top edge 7 of the spout 8 of the container around the flange 6 and is vented via apertures 14 in the top wall 9 of the cap.

A supplementary air vent (not shown) may be provided in the  
25 side wall of the cap to reduce the chances of a person's eyes being splashed by liquid during the venting process.

The closure means can be used on any form of collapsible container.

Figure 2 of the drawings illustrates a container 2 similar to that  
30 described by my Australian patent no. 738438.

Figure 3 of the drawings illustrates a box-type container 3

similar to the well known Tetra-pak™.

With respect to figures 4, 5 and 6 of the present invention according to a further aspect of the present invention, the closure may include a biasing spring 15 positioned between the base 16 of the dome 10 and the underside of the cap 4.

The spring 15 may be fabricated from stainless steel or food grade plastics and regulates the flow of air and liquid.

Figure 4 of the drawings shows the cap in a "compression" position. As a container 2 is compressed, air passes by the seal of the buoyancy valve and escapes via the bleeder holes in the top of the cap in a similar manner to that described in relation to figure 1. When fluid in the container 2 reaches the valve 5, it causes it to rise and block the flow of air via the bleeder holes as is the situation illustrated by figure 5. Once this happens, the container can no longer be compressed. When the container is released (figure 6) recoil from the concertina in the container draws the valve on to the container neck creating a hydraulic lock. With the valve in this position, the container cannot reinflate.

The cap is then tightened (figure 7) to create a permanent seal.

The spring 15 can be secured by upper and lower saddles 17, 18 formed in the dome and cap respectively.

The closure means of the present invention provides an economic, secure and simply operated device for venting collapsible containers to reduce headspaces.

Aspects of the present invention have been described by way of example only and modifications and additions thereto may be made without departing from the spirit or scope thereof.

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